

Trend Study 10-2-05

Study site name: Lower McCook Ridge Exclosure.

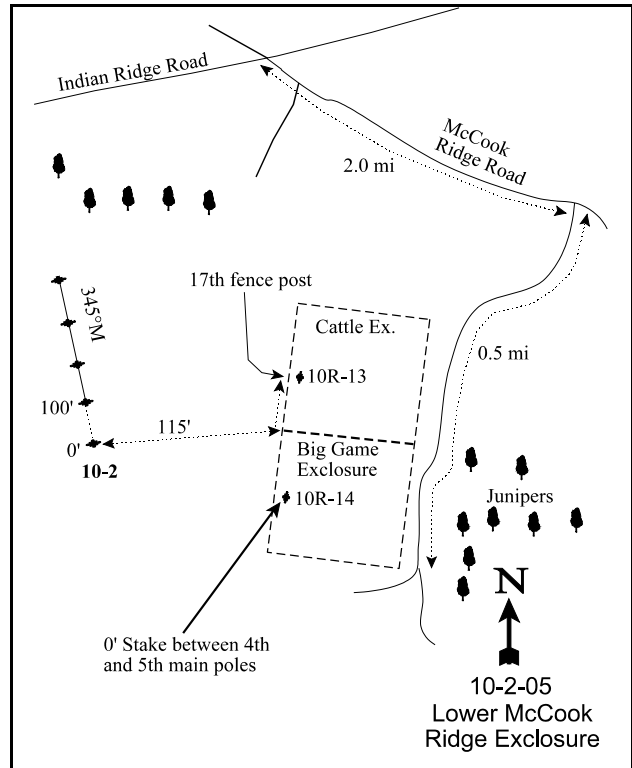
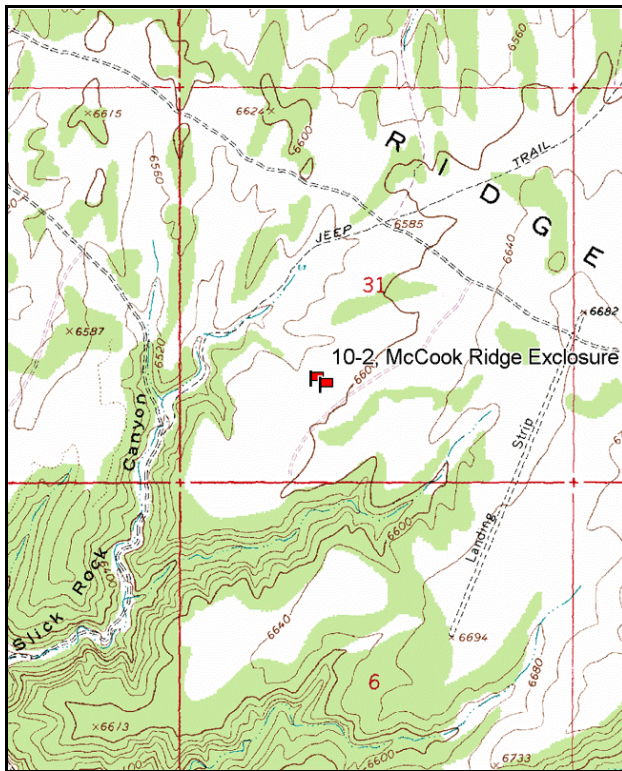
Vegetation type: Desert Shrub.

Compass bearing: frequency baseline 345 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From Ouray, go 38 miles south to the McCook Ridge-Indian Ridge turnoff. Turn left (east) and travel on the Indian Ridge road towards Sweetwater Canyon and McCook Ridge 9.1 miles to the intersection of Cooper Canyon, Indian Ridge and McCook Ridge. From Indian Ridge road, turn southeast and proceed up McCook Ridge approximately 2 miles to road on the right (A large exclosure can be seen off the south side of the road.). Turn right and drive approximately 0.5 miles to the exclosure. From the northwest side of the deer fence on the lower McCook Ridge Exclosure, the 0-foot baseline stake is approximately 40 paces away bearing 263°M. The frequency baseline is marked by green fenceposts, 12-18 inches tall.



Map Name: Cooper Canyon.

Diagrammatic Sketch

Township 13S, Range 24E, Section 31

GPS: NAD 27, UTM 12S 4388971 N, 647998 E

DISCUSSION

Lower McCook Ridge Exclosure - Trend Study No. 10-2

This study was established in 1982 and is found outside of the exclosure complex on Lower McCook Ridge. The exclosure was constructed in 1964. In addition to the regular monitoring schedule, this site was monitored in 1997 as part of the special studies designed to study perceived conflicts between elk and livestock use in the North Book Cliffs. Studies in the livestock (10R-13) and total exclosures (10R-14) were established in 1997. The site is on a broad swale that slopes gently to the northwest at an elevation of 6,600 feet. Vegetation composition is dominated by a mixed stand of basin big sagebrush, fourwing saltbush, winterfat, and fringed sagebrush. This is thought to be an important wintering area for elk and mule deer. Pellet group data from 2000 showed moderate use by wildlife with an estimated 27 deer days use/acre (67 ddu/ha) and 27 elk days use/acre (67 edu/ha). In 2000, only older cattle pats were sampled. Cattle use (800 AUM's) in this area is in the Lower McCook allotment on a rotational deferred system between fall and spring, allowing some periods of rest. In early June of 2005 cattle were on the site as it was monitored. Cattle use was estimated at 7 cow days use/acre (18 cdu/ha). Deer use was quite a bit higher in 2005 at 86 deer days use/acre (212 ddu/ha). Elk use was lower at 8 elk days use/acre (20 edu/ha). Rabbit use was high in 2005 with 68% of quadrats containing pellets.

The soil is light brown in color, alluvially deposited, and has a loam texture. Soils are slightly alkaline (pH of 7.6). Phosphorus is low (5.5 ppm), which could limit plant growth (Tiedemann and Lopez 2004). The effective rooting depth averages 18 inches overall, but varies over the length of the transect. Effective rooting depth is 26 inches at the beginning of the transect and decreases to 12 inches at the end of the transect. Contradictory to conventional thought, a higher density of basin big sagebrush exists where the soils are more shallow, and more cheatgrass where the soils are deeper. There is a small wash that runs through the end of the baseline and plant pedestaling is associated with the area. An erosion condition class assessment rated erosion as slight in 2005. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) decreased from 1:3.3 in 1997 to 1:2.6 in 2000 and 1:2.2 in 2005. Relative percent bare ground increased from 29% in 2000 to 44% in 2005. Much of this decrease can be attributed to reduced litter cover from a lack of cheatgrass during previous drought years.

Several key browse species exist on the site including: basin big sagebrush, winterfat, fringed sagebrush, and fourwing saltbush. Basin big sagebrush is the most abundant species. This is likely a hybrid between basin big sagebrush (*Artemisia tridentata tridentata*) and Wyoming big sagebrush (*A. tridentata wyomingensis*), but they were all classified as basin big sagebrush. Sagebrush cover has averaged 10-12% since 1995. Since 1995, when new methods and a larger sample size were used, population density was stable at about 3,900 plants/acre through 2000, but declined 12% to 3,500 plants/acre in 2005. Decadence has increased with each reading since 1995 from 11% to 35% in 2005. Twenty-four percent of the population was classified as dying in 2005. Recruitment was also lower in 2005 as only 5% of the population was classified as young, compared to about 31% in 1995 and 2005. The amount of seedlings has also declined with each reading and none were found in 2005. Drought during the early part of the decade has been detrimental to this population. Utilization also increased and was considered moderate to heavy in 2005.

Fourwing saltbush is a good quality forage, but is less abundant. Density has been slowly decreasing since 1995. Decadence has increased from 0% in 1988 to 66% in 2005, while a quarter of the population was classified as dying. Photos in 1988 show vigorous plants, compared to 2005 with decadent skeletons. Use on fourwing saltbush has been light to moderate except for 1995 and 2005, which had heavier use. Recruitment has been poor with each reading since 1988 when 29% of the population was classified as young.

Winterfat density estimates in 1982 and 1988 were comparable at around 3,500 plants/acre. Population estimates increased beginning in 1995 due to a larger sampling area instituted in 1992 which provided better

population estimates for species having clumped or discontinuous distributions. Data from 1995 indicated a much larger population of 10,420 plants/acre. Since then, density dropped to 7,020 plants/acre in 2000 and to 4,860 plants/acre in 2005. Utilization is difficult to determine due to the abundant annual growth. Use was classified as heavy in 2005. Use was classified as light to moderate in prior years. Vigor has been generally good. Recruitment was good in 1988 and 1995, but was low in 2000 and 2005. Drought conditions have caused the declines in this population. Other browse species encountered on the site include fringed sagebrush, broom snakeweed, and prickly pear cactus. Fringed sagebrush density and cover declined significantly in 2005 with the drought between 2000 and 2005.

Perennial grasses are deficient and consist mostly of Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass. All grasses had 30% to 60% of their growth removed during the 1988 reading. Sandberg bluegrass has remained at a nearly constant frequency since 1995. It has been the most abundant perennial grass with each reading. Bottlebrush squirreltail significantly increased in nested frequency in 2000, but decreased again in 2005. Most perennial grasses were found under the crown of shrubs. Cheatgrass is also abundant. Cheatgrass was lowest in 2000, which had a dry spring. It significantly increased in 2005. Cover was high in 1995 and 2005 at 16% and 14%, respectively. Scarlet globemallow is the most common perennial forb and frequency has been stable through all readings. Annual stickseed was quite common in 2005.

1982 APPARENT TREND ASSESSMENT

Soil trend appears to be stable to declining. To a large degree, the soil surface is barren of vegetation or effective litter cover. Vegetation trend is perhaps slightly more stable but still declining. With the exception of fourwing saltbush, the shrub populations appear to be expanding with mostly light use. Perhaps the most serious concern is an apparent rapid increase of broom snakeweed. Perennial herbs are nearly absent from the site and show no evidence of increasing.

1988 TREND ASSESSMENT

Changes on the Lower McCook Ridge Exclosure study since establishment in 1982 include an increase in both sagebrush density and use. Density of big sagebrush has increased from 3,966 plants/acre to 5,865 plants/acre. A majority of the big sagebrush have a moderately hedged growth form, with 14% appearing heavily hedged. Other browse are only lightly used. In 1988, 30% of the big sagebrush were classified as decadent, as opposed to 6% in 1982. Still, there is an adequate number of young shrubs in the population. There are differences and difficulties in the identification of big sagebrush on this site. The 1982 study reported Wyoming big sagebrush on the base line. The sagebrush was all called basin big sagebrush in 1988. There is a great deal of hybridization between these two subspecies on this site. A few more young fourwing saltbush were found in 1988, but populations of saltbush and winterfat are basically unchanged. Fringed sagebrush has increased, along with the snakeweed, which is currently the most abundant woody species. The density estimate for snakeweed was 6,766 plants/acre in 1988, while there were only 2,999 plants/acre in 1982. With a large number of seedlings, snakeweed continues to increase. Although cheatgrass still provides much of the ground cover, Sandberg bluegrass has increased in frequency. There continues to be a low diversity of forbs. Ground cover, in the form of mostly litter, has increased slightly. Total protective ground cover in 1988 was 64%, as opposed to 51% in 1982. Vegetation basal cover was low at 2.5%, due to a lack of understory herbaceous vegetation. Still, there was little evidence of erosion problems due to the level terrain.

TREND ASSESSMENT

soil - slightly up (+1)

browse - up (+2)

herbaceous understory - slightly up (+1)

1995 TREND ASSESSMENT

The soil trend has improved slightly due to increased protective ground cover provided by herbaceous vegetation, litter, and cryptogamic crusts. Percent bare ground declined in 1995 as well. Browse trend is stable. Winterfat is abundant and lightly utilized. Fourwing saltbush is more heavily utilized but appears to have a stable mature population. Basin big sagebrush has declined in density from 5,865 plants/acre in 1988 to 3,860 plants/acre in 1995. The sample size was greatly enlarged in 1995, which gives much better population estimates for browse species. The decrease may be attributed to a better population estimate than actual losses, as few dead plants are present to explain this decline. Decadence has decreased from 30% to 11%. The density of broom snakeweed has shown a 53% decrease since the 1988 reading as well. Due to the drought, this trend is consistent throughout most of the state. The herbaceous understory is in poor condition, produces little forage and is dominated by cheatgrass. Sandberg bluegrass is the most numerous perennial species. Forbs are not an important aspect of this site due to low frequencies, but they have shown increased sum of nested and quadrat frequency values on each successive reading. The most common forb is still scarlet globemallow. Overall, the perennial herbaceous trend is up, but it is still in very poor condition because of its weedy composition. The Desirable Components Index (see methods) rated this site as fair to good.

TREND ASSESSMENT

soil - slightly up (+1)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - fair to good (46) Lower potential scale

1997 TREND ASSESSMENT

Rock and pavement cover have increased since 1995 to nearly 19%. This is likely a result of the decrease in litter and vegetation cover due to drought. Percent bare ground has stayed nearly the same at 25%. Erosion on the site does not appear to be increasing at this time and the soil trend appears stable. Winterfat shows higher utilization in 1997 compared to 1995. The plants show good vigor with no decadent or dead plants reported. Fourwing saltbush vigor has declined and percent decadence has increased. The basin big sagebrush population has shifted to a more mature age structure with more decadent and dead plants reported. Basin big sagebrush contributes to 60% of the total browse cover. Broom snakeweed density has decreased by nearly 50% with a mostly mature age structure. The browse trend appears to be slightly down with the consideration of drought. Herbaceous understory has changed very little since 1995. Nested and quadrat frequencies have remained nearly the same. The herbaceous understory trend is stable, and as reported in 1995, still in very poor condition. The DCI score declined to fair due to less preferred browse cover, increased decadence, and lower recruitment.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - stable (0)

winter range condition (DC Index) - fair (37) Lower potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. Since 1997, cover of vegetation and litter have increased. The ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has decreased, but remains high enough not to warrant a downward trend. Erosion is currently minimal. Trend for browse is stable. Basin big sagebrush, which makes up half of the browse cover, shows increases in density and recruitment as well as decreased use. Percent decadency, the proportion of plants classified as dying, and plants displaying poor vigor all increased

in 2000. These parameters are likely caused, at least in part, to drought and should improve with normal precipitation. Fourwing saltbush shows improved vigor from the 1997 reading, and a slight decrease in decadency. Winterfat shows increases in use and decadency, but this species only contributes 9% of the browse cover. Trend for the herbaceous understory is up. Even with drought, sum of nested frequency for perennial species increased significantly since 1997. Also, cheatgrass decreased in nested and quadrat frequencies in 2000 due to the lack of moisture in the fall, winter, and spring. Composition is still weedy in nature, but perennials appear to be on the increase overall. The DCI score improved to good to excellent with increased browse cover, lower cheatgrass cover, and increased perennial grass and forb cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - up (+2)

winter range condition (DC Index) - good to excellent (64) Lower potential scale

2005 TREND ASSESSMENT

The trend for soil is slightly down as the ratio of bare ground to protective ground cover (vegetation, litter, and cryptogams) has decreased from 1:2.6 to 1:2.2. Bare ground has also increased, while litter cover has decreased. Erosion was rated as slight in 2005. The browse trend is down. Basin big sagebrush density declined 12% since 2000, while decadence increased to 35%, with 24% of the population classified as dying. Recruitment is also very low. Fourwing saltbush density only slightly declined, but two-thirds of the population were classified as decadent. A quarter of the plants were classified as dying. Hopefully, with a return to better precipitation patterns these plants can recover back to better condition. Recruitment has also been poor. Winterfat density declined 31% from 2000 and recruitment was very low, while use was heavy. Fringed sagebrush density also declined 75%, while cover decreased from 6% in 2000 to less than 1% in 2005. This is indicative of drought conditions during the past five years. The herbaceous understory trend is slightly down. The nested frequency of perennial grasses decreased slightly. Perennial forbs, which consist of fewer important forage species, decreased as well. Perennial grass and forb abundance is similar to 1995 and 1997. Cheatgrass also increased significantly compared to 2000. The DCI score was lower in 2005 and rated as fair due to lower browse cover, increased decadence, lower recruitment, low perennial grass and forb cover, and higher amounts of cheatgrass.

TREND ASSESSMENT

soil - slightly down (-1)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - fair (28) Lower potential scale

HERBACEOUS TRENDS --

Management unit 10 , Study no: 2

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	Agropyron dasystachyum	a-	a-	a-	a ⁴	b ¹⁵	-	-	.38	.22
G	Bromus tectorum (a)	-	c ²⁸⁸	c ²⁶³	a ¹⁷¹	b ¹⁹¹	15.91	5.44	4.17	13.75
G	Festuca ovina	4	-	-	1	-	-	-	.00	-
G	Oryzopsis hymenoides	1	7	15	10	10	.24	.22	.62	.06

Type	Species	Nested Frequency					Average Cover %			
		'88	'95	'97	'00	'05	'95	'97	'00	'05
G	<i>Poa secunda</i>	_a 30	_b 106	_b 120	_b 118	_b 128	2.04	1.35	4.42	1.79
G	<i>Sitanion hystrix</i>	_a 17	_b 52	_{ab} 42	_c 114	_b 72	.50	.70	2.50	1.39
Total for Annual Grasses		0	288	263	171	191	15.91	5.44	4.17	13.75
Total for Perennial Grasses		52	165	177	247	225	2.79	2.29	7.93	3.47
Total for Grasses		52	453	440	418	416	18.71	7.73	12.11	17.22
F	<i>Allium</i> sp.	-	2	-	2	-	.00	-	.00	-
F	<i>Calochortus nuttallii</i>	-	2	-	-	-	.00	-	-	-
F	<i>Chaenactis douglasii</i>	-	-	-	-	1	-	-	-	.00
F	<i>Chenopodium leptophyllum</i> (a)	-	-	-	-	1	-	-	-	.00
F	<i>Cymopterus</i> sp.	-	-	-	-	2	-	-	-	.00
F	<i>Delphinium nuttallianum</i>	-	2	2	-	-	.00	.00	-	-
F	<i>Descurainia pinnata</i> (a)	-	_{bc} 32	_{ab} 13	_a -	_c 30	.29	.08	.00	.29
F	<i>Draba</i> sp. (a)	-	_b 11	_a -	_a -	_{ab} 7	.02	-	-	.02
F	<i>Erigeron flagellaris</i>	-	1	-	-	-	.01	-	-	-
F	<i>Erigeron pumilus</i>	_b 32	_b 40	_b 42	_b 33	_a -	.25	.40	.29	-
F	<i>Lappula occidentalis</i> (a)	-	_b 55	_{ab} 38	_a 21	_c 108	.27	.29	.20	1.46
F	<i>Penstemon</i> sp.	-	-	2	-	-	-	.03	-	-
F	<i>Schoenocrambe linifolia</i>	_a -	_b 25	_a 2	_a -	_a -	.05	.00	-	-
F	<i>Sisymbrium altissimum</i> (a)	-	6	-	-	-	.07	-	-	-
F	<i>Sphaeralcea coccinea</i>	98	100	105	119	96	.75	.95	2.24	1.03
F	<i>Tragopogon dubius</i>	_a -	_a 2	_a -	_b 21	_a -	.01	-	.18	-
Total for Annual Forbs		0	104	51	21	146	0.66	0.38	0.20	1.78
Total for Perennial Forbs		130	174	153	175	99	1.09	1.39	2.71	1.04
Total for Forbs		130	278	204	196	245	1.75	1.77	2.92	2.82

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 10 , Study no: 2

T y p e	Species	Strip Frequency				Average Cover %			
		'95	'97	'00	'05	'95	'97	'00	'05
B	Artemisia frigida	69	53	70	46	3.04	2.94	6.44	.48
B	Artemisia tridentata tridentata	56	57	58	54	10.39	9.15	12.00	10.66
B	Atriplex canescens	27	10	24	25	1.99	.73	2.55	1.04
B	Ceratoides lanata	71	62	61	66	4.31	2.08	2.20	2.25
B	Gutierrezia sarothrae	39	31	40	20	1.41	.38	.95	.25
B	Opuntia sp.	3	0	4	2	.18	-	.03	.03
Total for Browse		265	213	257	213	21.34	15.30	24.19	14.73

CANOPY COVER, LINE INTERCEPT --

Management unit 10 , Study no: 2

Species	Percent Cover '05
Artemisia frigida	.28
Artemisia tridentata tridentata	10.51
Atriplex canescens	.95
Ceratoides lanata	2.40
Opuntia sp.	.06

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 10 , Study no: 2

Species	Average leader growth (in) '05
Artemisia tridentata tridentata	3.3
Ceratoides lanata	4.1

BASIC COVER --

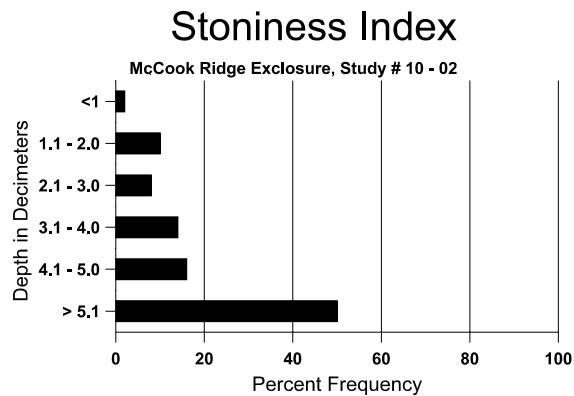
Management unit 10 , Study no: 2

Cover Type	Average Cover %					
	'82	'88	'95	'97	'00	'05
Vegetation	0	2.50	41.63	23.80	39.90	34.58
Rock	0	0	1.49	.56	.21	.24
Pavement	0	0	3.29	18.23	3.52	3.09
Litter	0	60.75	40.01	25.04	38.48	20.53
Cryptogams	0	.50	3.93	4.90	3.13	4.77
Bare Ground	49.25	36.25	26.30	25.04	35.13	50.37

SOIL ANALYSIS DATA --

Herd Unit 10, Study # 2, Study Name: McCook Ridge Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
18.4	61.0 (17.5)	7.6	35.0	38.8	26.2	1.9	5.46	185.6	0.5



PELLET GROUP DATA --

Management unit 10 , Study no: 2

Type	Quadrat Frequency			
	'95	'97	'00	'05
Rabbit	11	3	15	68
Elk	18	26	24	26
Deer	17	21	18	37
Cattle	-	1	-	4

Days use per acre (ha)	
'00	'05
-	-
28 (68)	8 (20)
27 (67)	86 (212)
-	7 (18)

BROWSE CHARACTERISTICS --

Management unit 10 , Study no: 2

		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia frigida</i>												
82	300	33	-	300	-	-	0	0	0	-	0	7/3
88	1199	233	233	966	-	-	0	0	0	-	0	7/5
95	9680	2520	3040	6640	-	-	.82	.82	0	-	0	12/10
97	7900	80	1080	6820	-	-	0	0	0	-	0	10/8
00	9800	8040	1000	8560	240	20	17	7	2	.40	.40	4/7
05	2420	380	580	1820	20	20	5	0	1	.82	.82	5/6
<i>Artemisia tridentata tridentata</i>												
82	3966	166	600	3133	233	-	5	0	6	-	6	24/33
88	5865	1766	2566	1533	1766	-	47	14	30	-	2	24/30
95	3860	1720	1200	2220	440	180	53	3	11	2	3	22/30
97	3040	160	420	2020	600	360	55	9	20	4	4	21/28
00	3980	20	1260	1700	1020	180	26	13	26	9	9	19/29
05	3500	-	180	2080	1240	500	41	37	35	24	24	24/31
<i>Atriplex canescens</i>												
82	400	-	-	400	-	-	0	0	0	-	0	27/21
88	700	-	200	500	-	-	0	0	0	-	0	26/29
95	980	20	120	760	100	60	27	12	10	-	0	26/33
97	240	-	20	120	100	40	8	8	42	17	17	29/28
00	700	-	-	420	280	-	29	3	40	-	0	31/35
05	640	20	40	180	420	-	28	56	66	25	25	23/36
<i>Ceratoides lanata</i>												
82	3466	-	733	2733	-	-	0	0	0	-	0	5/5
88	3698	-	1066	1766	866	-	2	0	23	-	3	7/4
95	10220	-	1440	8760	20	-	7	.58	0	-	0	10/10
97	7620	-	760	6860	-	-	42	0	0	-	0	8/9
00	7020	20	200	6100	720	-	43	21	10	.56	.56	8/9
05	4860	20	280	4460	120	40	18	77	2	.41	.41	6/7
<i>Gutierrezia sarothrae</i>												
82	2999	700	1333	1666	-	-	0	0	0	-	0	10/7
88	6766	5066	1633	5033	100	-	.49	.49	1	-	0	5/5
95	3200	200	1140	2000	60	40	0	0	2	-	0	9/9
97	1740	-	80	1640	20	80	0	0	1	1	1	7/7
00	3020	100	600	2280	140	60	0	0	5	1	1	5/7
05	740	-	80	660	-	-	3	0	0	-	0	6/7

		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
82	233	-	-	233	-	-	0	0	0	-	0	3/4
88	266	-	166	100	-	-	0	0	0	-	0	4/9
95	80	-	-	80	-	-	0	0	0	-	0	4/12
97	0	-	-	-	-	-	0	0	0	-	0	-/-
00	100	-	20	60	20	-	20	0	20	-	0	4/11
05	60	-	-	20	40	-	0	0	67	-	0	3/10
Pinus edulis												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
88	33	33	33	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-

LOWER MCCOOK RIDGE EXCLOSURE COMPARISON SUMMARY

Trend Study No. 10-2 (Outside), 10R-13 (Livestock), and 10R-14 (Total)

The Lower McCook Ridge area is important big game winter range. Several important key browse species are present in the area including: big sagebrush, winterfat, and fourwing saltbush. The table below compares some of the key browse parameters for these three species. Differences in densities for these species, especially sagebrush, may be the result of several factors including: grazing regimes, interspecific and intraspecific competition, small sampled area, timing of precipitation, and a non-homogeneous landscape.

Big sagebrush was classified as basin big sagebrush, but is most likely a hybrid between basin big sagebrush and Wyoming big sagebrush. Density and cover varies between the exclosures with the total exclosure having the lowest density of sagebrush plants, the livestock exclosure having the highest, and outside the exclosure being intermediate. Recruitment from the young age class was high in 2000, but was much lower in 2005. The rate of decadence is highest in the livestock exclosure, slightly lower outside the exclosure, with no decadence found in the total exclosure. There are several possible explanations for the differences in population parameters for sagebrush between exclosures. The highest level of recruitment occurs in the total exclosure where the sagebrush density is lowest, but with no use, each plant has more seed from year to year which increases the probability of young plants becoming established from seed. Also, with a lower density of sagebrush, there is less intraspecific competition with young plants to become established. The lowest recruitment is found in the livestock exclosure which also has the highest sagebrush density and average cover. Competition is greatest here with high density and cover which would appear to more negatively affect the establishment of younger plants. Drought adds to the problem with less resources being available and more stress being placed on individual plants.

Conversely, winterfat has the highest density and cover inside the total exclosure, is intermediate outside the exclosure, and is lowest inside the livestock exclosure. Recruitment from young plants is low on all three transects. Winterfat cover was about 6 times greater in the total exclosure than in both the livestock exclosure and outside the exclosure in 2000. Average height and crown measurements in 2000 show winterfat inside the total exclosure to be twice that of winterfat in either of the other two transects. With the highest density, highest cover, and largest individuals occurring inside the total exclosure, it is likely that competition is greater here and may be responsible for the highest rate of decadence inside the total exclosure. Drought is the likely cause for the decline of winterfat in 2005.

Fourwing saltbush has similar densities in the total and livestock exclosures, with a lower density outside the exclosure. Percent decadence has been high for each transect in each reading. The percent of the population classified as dying was very high in 2005 for each exclosure transect. As with winterfat, the high decadence of fourwing saltbush is likely due more to drought and/or competition rather than utilization.

The herbaceous understories have been similar for each transect.

Trend Data Comparisons for key browse species for Lower McCook Ridge Exclosure transects in 2000 and 2005.

2000				2005		
	Outside	Livestock	Total	Outside	Livestock	Total
Big sagebrush						
Average Cover	12.0	21.7	2.6	10.6	15.9	2.5
Density (plants/acre)	3,980	6,900	1,200	3,500	6,060	700
% young (plants/acre)	32 (1,260)	14 (1,000)	68 (820)	5 (180)	4 (260)	6 (40)
% decadent (plants/acre)	26 (1,020)	31 (2,140)	0	35 (1,240)	31 (2,140)	9 (60)
% dying (plants/acre)	24 (360)	3 (220)	0	24 (840)	26 (1,600)	0
% heavy use	13	30	0	37	66	0
Winterfat						
Average Cover	2.2	2.5	13.8	2.4	1.6	3.8
Density (plants/acre)	7,020	5,920	9,060	4,860	4,900	7,020
% young (plants/acre)	3 (200)	2 (140)	3 (240)	6 (280)	9 (420)	7 (520)
% decadent (plants/acre)	10 (720)	14 (820)	37 (3,340)	2 (120)	11 (560)	5 (340)
% dying (plants/acre)	1 (40)	3 (180)	2 (200)	0 (20)	7 (360)	2 (160)
% heavy use	21	3	0	77	91	13
Fourwing saltbush						
Average Cover	2.6	5.6	12.5	2.6	1.3	2.0
Density (plants/acre)	700	1,100	1,160	640	900	920
% young (plants/acre)	0	0	0	6 (40)	4 (40)	2 (20)
% decadent (plants/acre)	40 (280)	67 (740)	40 (460)	66 (420)	82 (740)	91 (840)
% dying (plants/acre)	0	13 (140)	5 (60)	25 (160)	47 (420)	72 (660)
% heavy use	3	13	0	56	38	2